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IX. *An Account of a Book entituled, Dominici Bottoni, de immani Trinacriæ Terræ Motu Idea Historico-Physica, in qua non solum Telluris concussions transactæ recensentur, sed novissimæ Anni 1717. Messanæ 1718. 8°. By J. G. Scheuchzer, M. D. R. S. S. Coll. M. L. Lic.*

THIS Treatise contains an accurate historical Account of the several violent Earth-quakes, which happen'd in the Kingdom of *Sicily*, in the Years 1693, 1694, and 1717. interspers'd with some philosophical Digressions concerning the Causes and Effects of Earth-quakes in general. I shall something enlarge upon the former, as being the more material, as well as the more curious Part of the Book; avoiding, however, with all possible Care, a tedious and unnecessary Repetition of what hath been already mention'd in another Account of those two dreadful Succussions, which happen'd the 9th and 10th of *January*, 1693. written by *Vincentius Bonajutus*, a *Sicilian* Noblenan. This Account was communicated to the *Royal Society* by the late learned *Marcellus Malpighius*, and is inserted in the *Philos. Transact.* N° 207. p. 2.

The Summer Seafon, in 1692. was exceedingly hot and tempestuous, with frequent Thunders, Lightnings and Rains. About the middle of *September* fell such profuse Showers, that all the Rivers and Torrents increased to such a Degree, as to overflow their Banks in several Places, and cover large Pieces of Ground with Water. This, join'd to the continual blowing of South-

erly Winds, during the *Autumn*, put the Inhabitants under great Apprehension of future Mischiefs. And indeed, the disastrous Fate, which befel *Sicily* about the Beginning of 1693, too manifestly prov'd, that this ominous Fear was no way groundless. For on *Friday* the 9th of *January*, about the 5th Hour (according to the *Italian* Way of counting) after a warm, serene and calm Day, the Earth began trembling all of a sudden, chiefly about *Catania*; and in some neighbouring Places, for the Time required to say the Lord's Prayer. This first Shake was accompany'd, as generally happens in Earthquakes, by a hollow, thundering Noise, and succeeded by another small Trembling, observ'd only by some few People on *Saturday*, early in the Morning. These two Succussions, though violent enough, were but a Prelude of the third, which happen'd the 11th of the same Month, by 4. of the Clock in the Afternoon, of which the Apprehension was so much the greater, because all the 10th and 11th, between the first and third Shake, the Air was more than usual dark and cloudy. This last was stupendous beyond human Imagination, and it would be a Task too difficult for even the ablest Pen, to describe all its dreadful Effects; the violent tossing and dancing of the Earth; the hollow, thundering Noise threatening the whole Island with its entire Dissolution; the fiery Eruption of the burning *Etna* throwing out a prodigious Quantity of Flames, Stones and Ashes; the Terror and Confusion of the distracted Inhabitants running up and down the Streets, uncertain where to provide for their Safety, or how to escape the Fury of all the raging Elements, which seemed to have conspired their Ruin. There was scarce one Place all over the Kingdom left without some particular Misfortune, *Catania*, *Syracusa*, *Agosta*, *Messina*, *Noto*, *Ragusa*, *Leontini*, *Ibla*, *Chiarumonte*,

Chiarumonte, Carleontino, Caltagirone, Sctino, Francofonte, Bontello, Militello, Occhiali, Aydono, Motica, Mascali, were all, if not entirely destroy'd, at least miserably shatter'd, many Churches and stately Buildings, up and down the Country, violently thrown down, and above 60000 Inhabitants buried under the Ruins, of which about 16000 perished only at *Catania*.

In many Places the Earth gap'd prodigiously. Such an Opening was observed near *Messina*, in the very Bottom of the Sea ; another near a Village call'd *Botto d'Aceto*, 250 Paces long, and near 8 Palms broad ; another at *Caltaniseta*, near the Jesuits-College, 2000 Paces long and 2 Palms broad ; another, at the Top of a Hill near *Leontini*, full wide enough to hold a Man ; another upon the Road between *Catania* and *Leontini*, which swallow'd up some Mule-keepers, then, to their great Misfortune, happening to travel that way, along with their Mules and whole Baggage, that not the least Foot-step of them remain'd. Silently to pass over a great many more, but of less Consideration.

Out of all these Openings sprung forth a great Quantity of Water, which drown'd the neighbouring Places. This Water was in some Places hot, with a strong sulphureous Smell, which lasted, even after the Earthquakes were over, and induc'd some of the Inhabitants, not without Success, to make use of it in curing of Ulcers, and other cutaneous Diseases, for which chiefly a hot Well near *Lazaretto* became very famous. Out of some of these Gapings of the Earth issued a thick Stench and Smoke, very troublesome to all the Neighbourhood. This happen'd, amongst other Places, upon a Mountain called *S. Theodor*, as also near *Mena*. Near *Agosta* it was preceded by a sulphureous red Flame.

Just at the Time of the second Shock, the Sea retir'd from the Land all along the Coasts, leaving its Bottom dry'd up for a considerable Distance, and within few Minutes return'd again with great Fury, and overflow'd the Shores. By this Accident the *Maltese* Gallies, lying at Anchor in the Harbour of *Agosta*, were in danger of being lost; for the Sea sunk down all of a sudden, so that they came to sit almost upon the Ground, and immediately after bubbled and swell'd up again with so great an Emotion, that they run the Hazard of having their Cables broke, and being driven away.

And it seemed that the Earth itself was in some Places considerably lower'd, and the Tops of the Mountains deppress'd. Of this they had a remarkable Instance at *Paternione*. The Hills, between this City and the Shore, hinder'd it from having any View of the Sea, which since the Earthquake discovers itself towards the East very plainly.

In other Places the Earth actually sunk down, and instead of it appear'd great Lakes, some of which were large enough to become navigable. By the breaking forth of such a Lake between *Noto* and *Syracusa*, a large Piece of Ground was transported for about 50 Paces, where it now stands as firm, as if it had always stood there.

The Loosening and Fall of two great Rocks between *Terula* and *Caffero* is already sufficiently describ'd in the abovementioned Account of Signor *Bonajuti*: Such Loosening and throwing down of great Rocks happen'd every where up and down in the Country, to the great Terror of the neighbouring People. The same was also observ'd, according to *Kircher*, and several other Authors, in some Earthquakes in the Kingdom of *Naples*. Two very high Rocks near *Ibla*, with all the Trees growing thereon, were by the Violence of the Fall, quite

quite inverted, that the Top came to stand upon the Ground.

About two Miles off from the City of *Mena*, lies a Lake full of a bituminous, sulphureous and combustible Matter, formerly famous under the Title of *Lacus Palicorum*. Upon this Lake there was observ'd, the very Day of the Earthquake, about a Quarter of an Hour before the second Shock, a great red Flame, like a fiery Column of above three Yards perpendicular Height, which, during the Earthquake itself, on a sudden disappear'd.

At *Agosta*, the Misfortune was so inuch the greater, because, besides all the dreadful Effects of the Earthquake itself, the Powder-Magazine, in the Castle, by some ill Accident, and perhaps by the violent Fall over one another of the Stones of some ruined Buildings (or by the breaking out of some subterraneous Flame) unluckily took Fire, by which the whole Castle was blown up with such a Fury, that some of the Stones were carry'd as far as the Island *Thapsus*, which is near 8 *Italian* Miles distant from *Agosta*. By this Accident perish'd 1840 Inhabitants.

There remains still one thing worth observing, and that is the very Rise and Progress of this terrible Succussion. It arose in the South, and proceeded from thence towards the North. For it was first observed in the Island of *Malta*; then in the Southern Parts of *Sicily*; and last, always with some Difference as to the Time, in the Northern Parts of the same Kingdom. But the Shakes were less violent, the more it approach'd to the North. For the rest, it extended itself to far, that not only the Island of *Malta*, but also *Calabria*, and some Parts in the Kingdom of *Naples*, participated of its Fury.

Nor was this the End of all the Miseries which befel this noble Kingdom: for the Earth continued trembling for several Months after, during the whole Year of 1693. In the remaining Part of *January*, and from that Time to the Beginning of the Summer, the Shakes came strong and thick, with hollow terrible Noises, and frequent Eruptions of *Ætna*. The most considerable were observ'd *February* the 15th in the Morning; *March* the 1st; *March* the 18th, by one of the Clock; *May* the 10th; *May* the 26th in the Morning. Towards the End of the Summer, the Shakes were observ'd to lose a great deal of their Force, and *Ætna* to throw out Flames and Ashes in less Quantity, when on the 4th of *September*, this ignivorous Mountain, having been some Days before very quiet, trembled and crack'd all of a sudden, with so loud and thundering a Noise, as if some Thousands of Guns were fir'd all at once. This was succeeded by a new Opening, about 1000 Paces distant from the old Mouth, out of which immediately issu'd a thick Stench and Smoke, follow'd by a great Flame. The same Mountain open'd itself in two other Places, with the like Noise, and Eruption of Smoke and Fire, the 25th of *September*, 1693, and the 1st of *April*, 1694. Since that Time the Shakes became visibly weaker and weaker, and at last entirely wasted.

As to the Earthquake which happen'd *April* the 22d, 1717. early in the Morning, and of which the Author hath given a short Account by way of Appendix; I shall not insist upon its Effect, being much the same with the former, though far inferior as to the Degree of Violence.

Thus far, what I could gather out of this Treatise, relating to the History of the *Sicilian* Earthquakes in 1693 and 1717. I proceed now, with all possible Brevity, to run over the several Observations, which our Author maketh

maketh about the Causes and Effects of Earthquakes in general: He observeth,

That such Countries as abound much with Fossil-coals, as *England*, some Parts of *Germany*, and even *Sicily* itself, are more subject to Tremblings of the Earth, than any other.

That pestilential and other Diseases, which frequently follow great Earthquakes, are rather to be ascrib'd to noxious and infected mineral *Effluvia*, which upon such an Occasion issue out of the Earth through the several Openings, than to the Putrefaction of dead Bodies, which perish'd in the Earthquake, and were buried under the Ruins of destroy'd Buildings.

That amongst the Minerals hidden in the Entrails of the Earth some are combustible, some not; that of the combustible Ones, as Sulphur, Bitumen, Alum, Vitriol, Salt-Petre, &c. some take Fire quicker than others; that others, as Coals, are with greater Difficulty to be inflamed, but keep the Fire so much the longer; that the Heat and sulphureous Sinell of the Waters, which broke first through the Openings of the Earth, probably depends upon the Mixture and Fermentation of some of these Minerals.

That *Baccius*, *Kircher*, and others, which draw the Origin of the abovementioned sulphureous Lake near *Mena*, and of several others in other Places from the subterraneous Cavities of the Mountain *Etna*, are much in the wrong, there being not the least Necessity of its being derived so far, since the Country every where abounds with combustible Minerals, which rather seem to entertain and nourish the fiery Eruptions of *Etna*, than to be occasion'd by them.

That the Sea's retiring from the Shore, and sinking down, is the less to be wonder'd at, since there are many Examples in Histories of whole Towns and Islands swallow'd

low'd up by it. This Misfortune befel, according to *Pliny, Tyndarida*, formerly a famous City in *Sicily*.

That in all probability *Sicily* itself, which, by the Testimonies of *Diodorus Siculus, Strabo, Pomponius Mela, Plinius, Solinus, Justinus, Seneca*, and several others, both antient and modern Authors, appears to have been formerly annex'd to the Continent of *Italy*, by a small Neck of Land between the Cape of *Messina* and the lower Parts of *Calabria*, was separated from it by some violent Succussion of the Earth.

That the ignivorous *Ætna*, far from being the Cause, as some imagine, of the Earthquakes, which so often desolate the Kingdom of *Sicily*, seems rather to have been created by the allwise Providence, in order to secure this Island by its fiery Eruptions from more frequent Misfortunes.

That contrary to what *Aristotle* and some others assert, solid and rocky Places receive infinitely more Damage by Earthquakes, than loose, sandy Grounds. This appears by the Ruins of *Catania, Leontini, Augusta, Syracusa*, and *Noto*, which were all built upon a solid stony Ground, whereas *Messina*, though every where undermin'd by subterranean Cavities, was abundantly less shaken.

The remaining Part of the Book is employ'd about examining the Opinions of all the antient and modern Philosophers about the Causes of Earthquakes, and establishing the Author's own, which is, that the Earth is shaken by the Violence of subterraneous Fires, occasion'd by the Fermentation of the combustible Minerals hid in its Entrails, and that the Effects of the Earthquakes may in all Regards be compar'd to the Effects of Mines. By the way, he observeth, that the Causes of Thunder, Lightning and Winds may be deriv'd from the same Principle.